KGC-240 Series

Industrial 10/100/1000Base-T to

Dual-speed Fiber Media Converter

Installation Guide

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FCC NOTICE
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including the interference that may cause undesired operation.

CE NOTICE
Marking by the symbol indicates compliance of this equipment to the EMC directive 2014/30/EU of the European Community. Such marking is indicative that this equipment meets or exceeds the following technical standards:

EMC Class A
IEC 61000-6-4
CISPR 22
    IEC 61000-3-2
    IEC 61000-3-3
IEC 61000-6-2
CISPR 24
    IEC 61000-4-2
    IEC 61000-4-3
    IEC 61000-4-4
    IEC 61000-4-5
    IEC 61000-4-6
    IEC 61000-4-8
    IEC 61000-4-11

VCCI-A Notice

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Table of Contents

1. Introduction

The KGC-240 is Gigabit Ethernet media converter series which provide the following features:

Data Conversion between different Media types and Speed

The media converter supports the following conversions:

- 1000Mbps (1000BASE-T) copper to/from 1000Mbps (1000BASE-X) fiber

- 100Mbps (100BASE-TX) copper to/from 1000Mbps (1000BASE-X) fiber

- 10Mbps (10BASE-T) copper to/from 1000Mbps (1000BASE-X) fiber

- 1000Mbps (1000BASE-T) copper to/from 100Mbps (100BASE-FX) fiber

- 100Mbps (100BASE-TX) copper to/from 100Mbps (100BASE-FX) fiber

- 10Mbps (10BASE-T) copper to/from 100Mbps (100BASE-FX) fiber

Dual-speed SFP Fiber Connectivity

The SFP port can be installed with different optional SFP optical fiber transceiver to support multimode or single mode fiber for short reach up to long reach distance. The SFP can support both 1000BASE-X and 100BASE-FX fiber connection. This feature extends a wider application range with this device.

Link Fault Pass-Through

This important feature of a media converter can force the link to shut down as soon as it notices that the other link has failed. It allows a link partner on one cable segment can notice a link fault occurred on the other segment and give application a chance to react.

1.1 Features

- Tri-speed 10/100M/1Gbps copper to dual-speed 100M/1Gbps fiber conversion
- Comply with IEEE 802.3, 802.3u, 802.3ab, 802.3z standard
- Support full wire speed conversion for Gigabit copper to Gigabit fiber
- Support auto-negotiation with link partners
- Provide dual-speed SFP on fiber port for mounting variety of fiber options
- Provide important LFPT (Link Fault Pass Through) media converter function
- Support Jumbo frame conversion
- Energy efficient Ethernet (EEE) support
- Alarm events relay output
- Ideal solution for multimode, short reach up to long reach single mode fiber, Bi-Di applications
- Industrial-rated emission and immunity performance
- EN 50121-4 compliance for railway applications

1.2 Product Panels

The following figure illustrates the panels of the device:
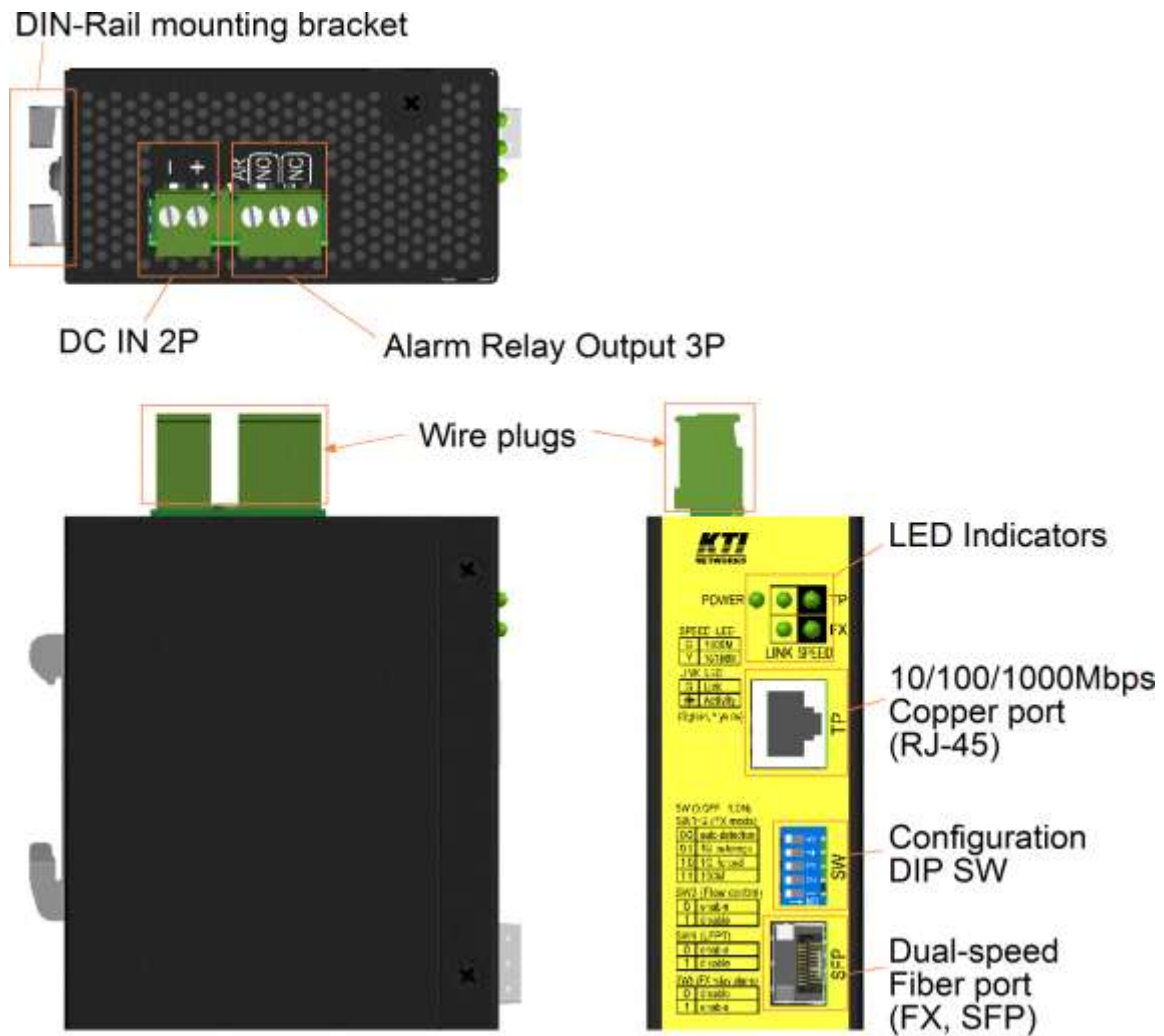
1.3 LED Indicators

LED	Function
POWER	Power status
TP SPEED	UTP port speed status
TP LINK	UTP port link status
FX SPEED	FX port speed status
FX LINK	FX port link status

1.4 Specifications

10/100/1000 Twisted-pair Copper Port (UTP, RJ-45)

Compliance	IEEE 802.3 10Base-T, IEEE 802.3u 100Base-TX, IEEE 802.3u 1000Base-T
Connectors	Shielded RJ-45 jacks
Pin assignments	Auto MDI/MDI-X detection
Configuration	Auto-negotiation, manual settings or software control
Transmission rate	10Mbps, 100Mbps, 1000Mbps
Duplex support	Full/Half duplex
Network cable	Cat.5 UTP or better

Dual-speed Fiber Port (FX, SFP)

Compliance	IEEE 802.3 1000Base-X, 100BASE-FX
Connectors	SFP for optional SFP type fiber transceivers
Configuration	Auto, 1000Mbps Full duplex Auto-negotiation, 100Mbps Full
Transmission rate	1000Mbps, 100Mbps (Dual-speed support)
Network cables	MMF 50/125 60/125, SMF 9/125
Eye safety	IEC 825 compliant

Configuration DIP SW

SW1 SW2	Fiber port operating mode setting
SW3	Flow control setting
SW4	Link fault pass through function setting
SW5	FX relay alarm function setting

Basic Functions

MAC Addresses	Support up to 8K
Forwarding technology	Store and forward
Maximum packet length	Jumbo frame support up to 9600 bytes
Flow control	IEEE 802.3x pause frame base for full duplex operation Back pressure for half duplex operation

DC Power Input

Screwed terminal block	2P (DC+, DC-)
Operating Voltages	+12 ~ +30VDC
Power Consumption	4.2W max.
Power Saving Mode	Total consumption 3.4W@+12V when all ports link down

Protection	Polarity Reversal

Alarm Relay Output

Screwed terminal block	3 dry contacts for NC & NO pairs
Contact rating	30VDC/1A or 120VAC/0.5A
Alarm events	Power failure, configured fiber port link faults

Mechanical

Dimension (base)	40 x 80 x 95 mm (WxDxH)
Housing	Enclosed metal with no fan
Mounting	Din-rail mounting, Panel mounting (with optional bracket)

Environmental

Operating Temperature	Typical -40°C ~ +75°C
Storage Temperature	-40°C ~ +85°C
Relative Humidity	5% ~ 95% non-condensing

Tests and Approvals

FCC Part 15 rule Class A

CE EMC Class A

VCCI Class A

IEC 61000-6-4 Emission

IEC 61000-3-2

IEC 61000-3-3

IEC 61000-6-2 Immunity for industrial environment,

IEC 61000-4-2

IEC 61000-4-3

IEC 61000-4-4

IEC 61000-4-5

IEC 61000-4-6

IEC 61000-4-8

IEC 61000-4-11

LVD, IEC60950-1 Safety

IEC 60068-2-64 Vibration

IEC 60068-2-27 Shock test

NEMA TS2 environment

EN 50121-4 Railway application

2. Installation

2.1 Unpacking

The product package contains:

- The device unit for Din-rail mounting
- One product CD-ROM

2.2 Safety Cautions

To reduce the risk of bodily injury, electrical shock, fire and damage to the product, observe the following precautions:

|	
	Do not service any product except as explained in your system documentation.
	Opening or removing covers may expose you to electrical shock.
	Only a trained service technician should service components inside these compartments.
	If any of the following conditions occur, unplug the product from the electrical outlet and replace the part or contact your trained service provider: - The power cable, extension cable, or plug is damaged. - An object has fallen into the product. - The product has been exposed to water. - The product has been dropped or damaged. - The product does not operate correctly when you follow the operating instructions.
	Do not push any objects into the openings of your system. Doing so can cause fire or electric shock by shorting out interior components.
	Operate the product only from the type of external power source indicated on the electrical ratings label. If you are not sure of the type of power source required, consult your service provider or local power company.
	T_{amb}=75°C — Since the product is high temperature device, install and operate the product only by authorized personnel only. Install the product at a restricted area where un-authorized persons can not reach.

2.3 Mounting the Device to a DIN-Rail

In the product package, a DIN-rail bracket is provided or has been installed for mounting the device in a industrial DIN-rail enclosure.

The steps to mount the device onto a DIN rail are:

1. Install the mounting bracket onto the back of the device with screws as shown below:
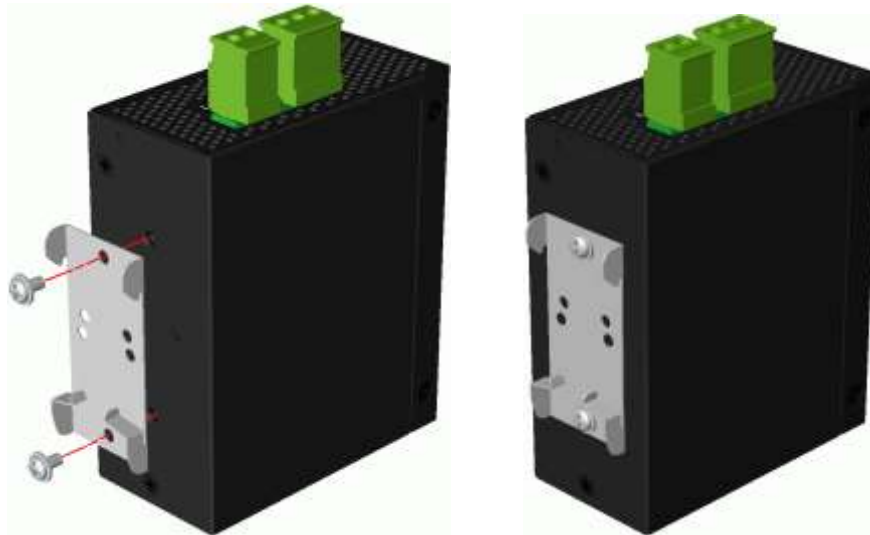
2. Attach bracket to the lower edge of the DIN rail and push the unit upward a little bit until the bracket can clamp on the upper edge of the DIN rail.

3. Clamp the unit to the DIN rail and make sure it is mounted securely.

The final dimension is:

Unit:mm
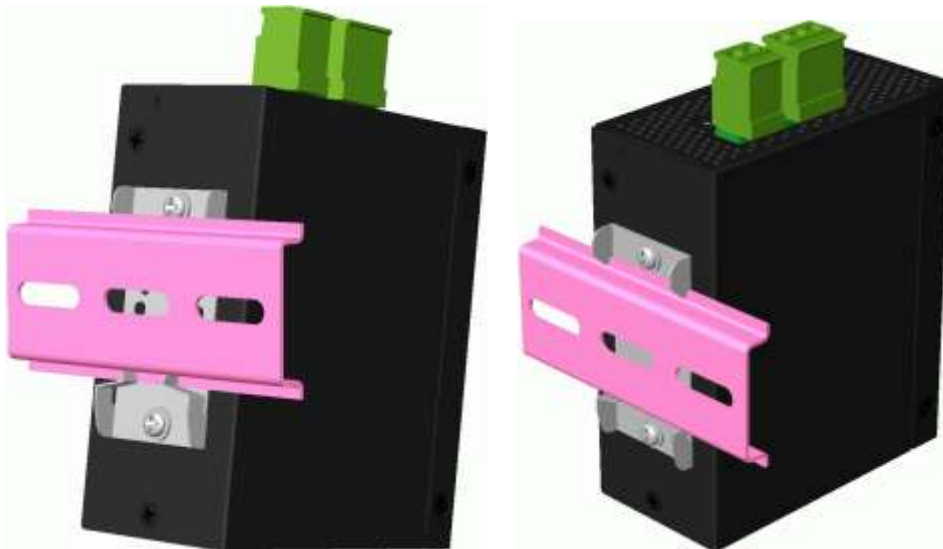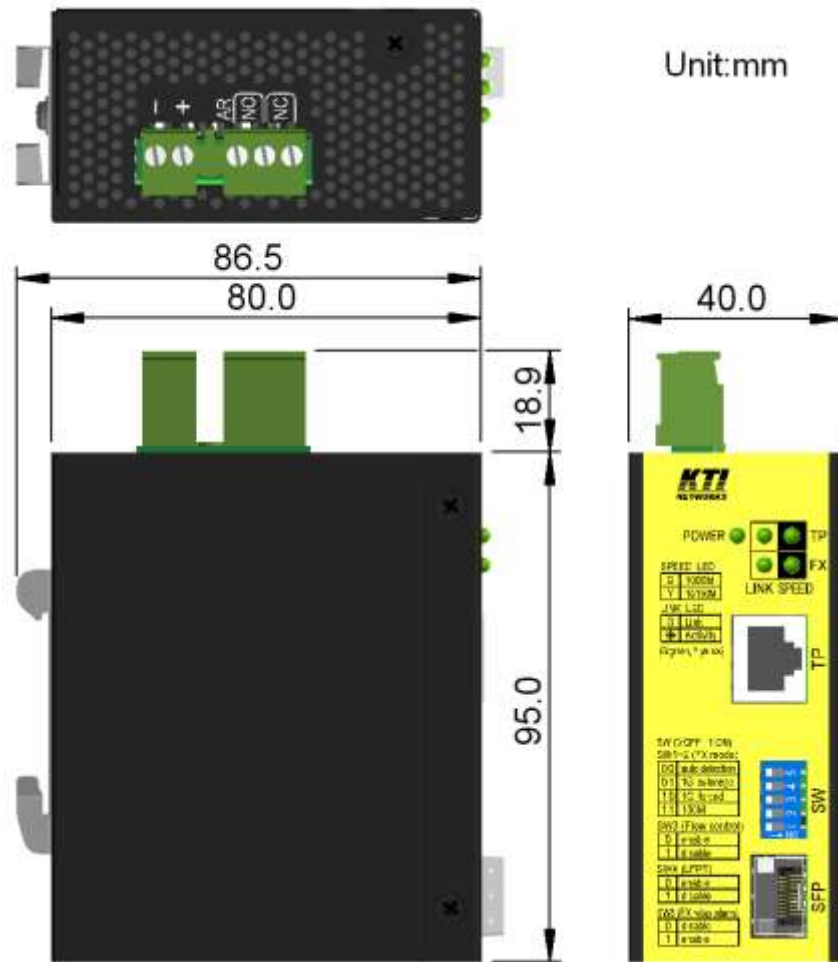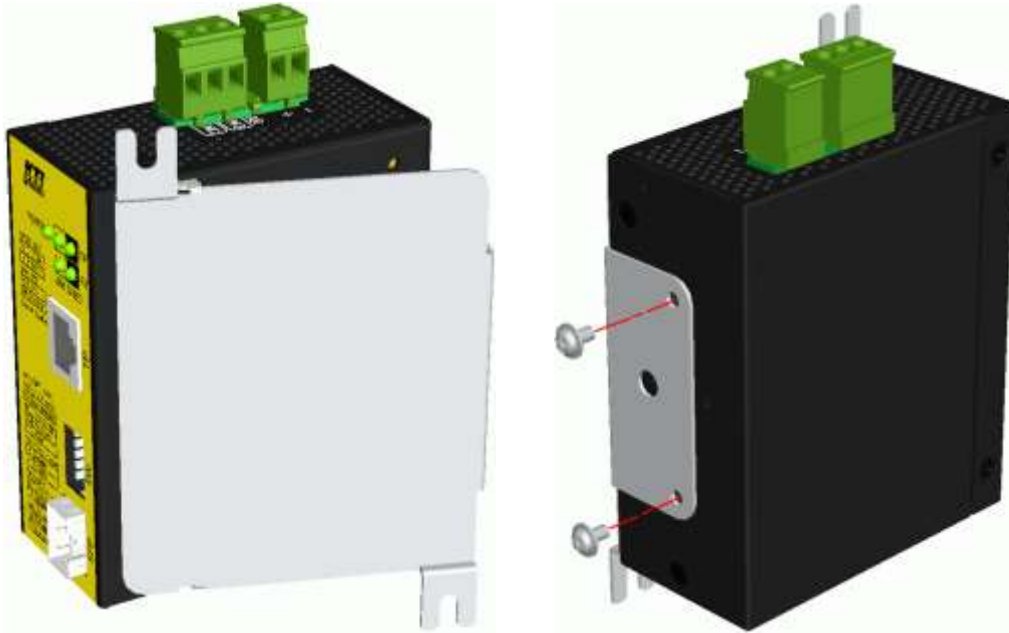
2.4 Mounting the Device on a Panel

The device may be provided optionally with a panel mounting bracket. The bracket supports mounting the device on a plane surface securely. The mounting steps are:

1. Install the mounting bracket on the device.

2. Screw the bracket on the device.

3. Screw the device on a panel and the locations for screws are shown below:

The final dimension is:

2.5 Applying Power

Power pins of the terminal block connector

Pin	1	–	DC– Positive (–) input terminal
	2	+	DC+ Negative (+) input terminal
	3	×	Reserved

DC+/- Input specifications

Working voltage range: +12V ~ +30VDC

Terminal Plug & Power Wire

A 2P terminal plugs are provided together with the device as shown below:

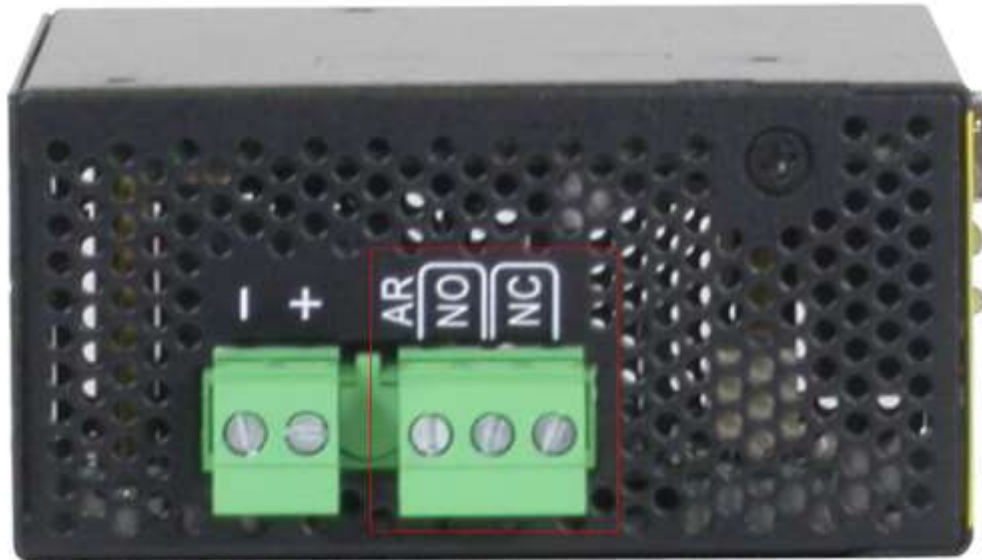Power wires: 24 ~ 12AWG (IEC 0.5~2.5mm²)

Wire length: 1 meter max.

2.6 Alarm Relay Output

Alarm relay output is provided for reporting failure events to a remote alarm relay monitoring system. The replay output is provided with three contacts on the terminal block connector next DC power interface.

Alarm Relay output pins and logic:

Pin			
	4	5	Alarm relay output, NO (Normal Open) contacts
	NO		Normal: Open, Alarm: Shorted
	5	6	Alarm relay output, NC (Normal Close) contacts
	NC		Normal: Shorted, Alarm: Open

The relay output can connect relay monitoring system. NO and NC logic are provided individually for selection. Use the provided 3P terminal plug for signal wiring and plug into the contacts.

Alarm Events

- Input power failure
- Configured fiber port link fault. (This event can be disabled via DIP SW5 setting. Refer to next section for DIP SW configuration.)
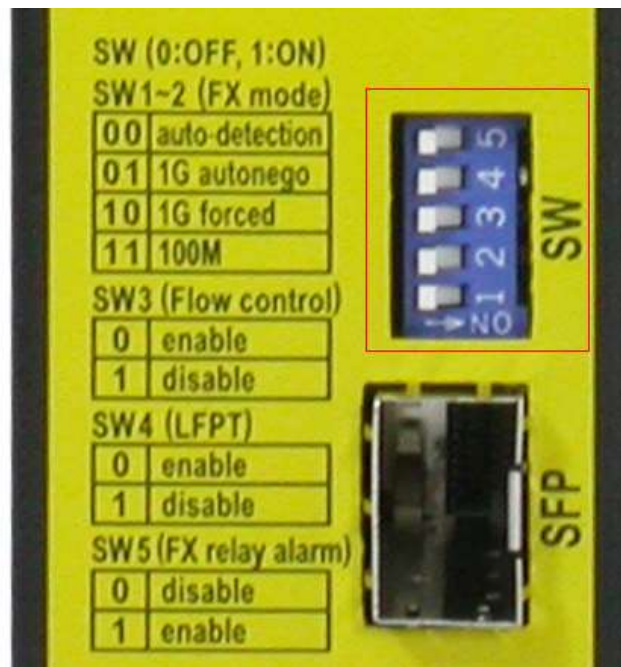
Note:
Be sure the voltage applied on the relay contacts is within the specification of 30VDC/1A max. or 120VAC/0.5A max.

2.7 DIP SW Configuration

The configuration DIP SW (setting switches) is used for setting operation configuration manually. Any change of DIP SW settings takes effect immediately.


The functions of each DIP SW states are:

SW1	SW2	SW3	SW4	SW5	Function
OFF	OFF				FX port operating mode: Auto-detection for the type of the SFP fiber transceiver module installed in slot > 1000BASE-X type - 1Gbps, Full duplex, Auto-negotiation enabled > 100BASE-FX type - 100Mbps, Full duplex, Forced > Unknown type - 1Gbps, Full duplex, Auto-negotiation enabled
OFF	ON				FX port operating mode: 1Gbps, Full duplex, Auto-negotiation enabled
ON	OFF				FX port operating mode: 1Gbps, Full duplex, Forced (Auto-negotiation disabled)
ON	ON				FX port operating mode: 100Mbps Full duplex, Forced (Auto-negotiation disabled)
		OFF			Enable Flow Control
		ON			Disabled Flow Control
			OFF		Enable LFPT function (Refer to section 4.2.)
			ON		Disable LFPT function
				OFF	Disable FX port link fault relay alarm
				ON	Enable FX port link fault relay alarm

Note: Factory default settings: blue background

3. Making LAN Connections

3.1 10/100/1000 Copper Port
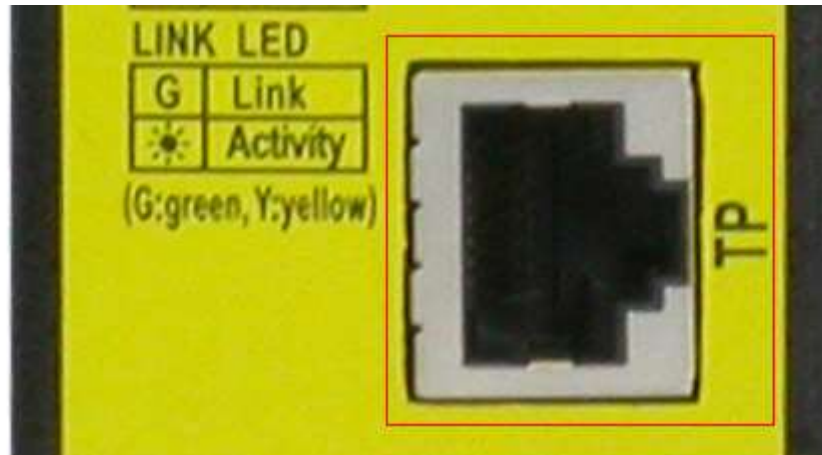
The 10/100/1000 RJ-45 TP port supports the following connection types and distances:

Network Cables

|	
10BASE-T:	2-pair UTP Cat. 3, 4, 5 , EIA/TIA-568B 100-ohm
100BASE-TX:	2-pair UTP Cat. 5, EIA/TIA-568B 100-ohm
1000BASE-T:	4-pair UTP Cat. 5 or higher (Cat.5e is recommended), EIA/TIA-568B 100-ohm
Link distance:	Up to 100 meters for all above

Auto MDI/MDI-X Function

This function allows the port to auto-detect the twisted-pair signals and adapts itself to form a valid MDI to MDI-X connection with the remote connected device automatically. No matter a straight through cable or crossover cable are connected, the ports can sense the receiving pair automatically and configure themselves to match the rule for MDI to MDI-X connection. It simplifies the cable installation.

Auto-negotiation Function

The port is featured with auto-negotiation function and full capability to support connection to any Ethernet devices. The port performs a negotiation process for the speed and duplex configuration with the connected device automatically when each time a link is being established. If the connected device is also auto-negotiation capable, both link partners will come out the best configuration after negotiation process. If the connected device is incapable in auto-negotiation, the port will sense the speed and use half duplex for the connection.

3.2 Making Fiber Connection

The SFP slot (FX port) must be installed with an SFP fiber transceiver for making fiber connection. Your device may come with an SFP transceiver pre-installed when it was shipped.
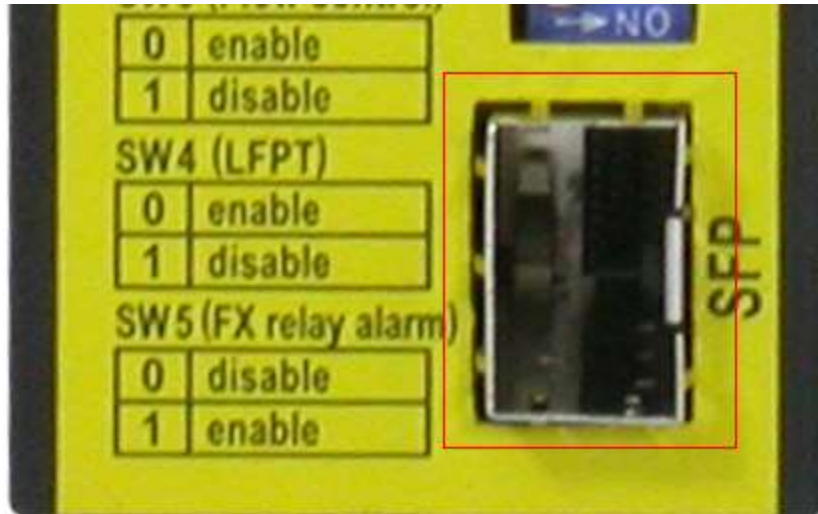
Installing SFP Fiber Transceiver

To install an SFP fiber transceiver into SFP slot, the steps are:

1. Turn off the power to the device unit.
2. Insert the SFP fiber transceiver into the SFP slot. Normally, a bail is provided for every SFP transceiver. Hold the bail and make insertion.


3. Until the SFP transceiver is seated securely in the slot, place the bail in lock position.

Dual Speed Support

The SFP slot supports 1000BASE-X based SFP fiber transceivers and 100BASE-FX based SFP fiber transceivers. Refer to Section 2.7 DIP SW Configuration for FX port operating mode setting.

Connecting Fiber Cables

LC connectors are commonly equipped on most SFP transceiver modules. Identify TX and RX connector before making cable connection. The following figure illustrates a connection example between two fiber ports:
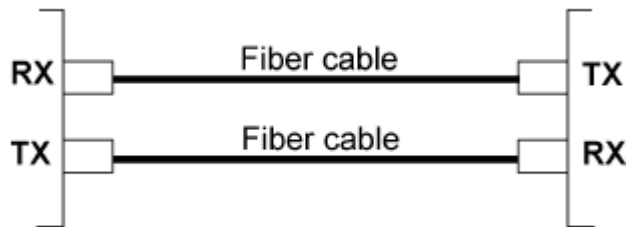
Make sure the Rx-to-Tx connection rule is followed on the both ends of the fiber cable.

Network Cables

Multimode (MMF) - 50/125, 62.5/125

Single mode (SMF) - 9/125

3.3 LED Indication

OPERATION

LED	Function	Color	State	Interpretation
POWER	Power status	Green	ON	The power is supplied to the device.

			OFF	The power is not supplied to the device.
TP SPEED	Port speed status	Green	ON	TP port is running on speed 1Gbps (1000Mbps)
		Yellow	ON	TP port is running on speed 100Mbps or 10Mbps
TP LINK	Port link status	Green	ON	TP Port link is established.
		Green	BLINK	TP Port link is up and there is traffic.
			OFF	TP Port link is down.
FX SPEED	Port speed status	Green	ON	FX port is running on speed 1Gbps (1000Mbps)
		Yellow	ON	FX port is running on speed 100Mbps
FX LINK	Port link status	Green	ON	FX Port link is established.
		Green	BLINK	FX Port link is up and there is traffic.
			OFF	FX Port link is down.

POWER-UP

LED	Color & State	Interpretation
2 SPEED LEDs	Quick blinking	Device initialization
All 4 LEDs	Green ON -> Yellow ON -> OFF	Device initialization finished with normal result
2 SPEED LEDs	Slow blinking	Device initialization finished with error result

4. Functions

This chapter describes some advanced functions provided by the media converter.

4.1 Converter Function

Media Conversion

The device supports the following data conversions between fiber cable and twisted-pair Cat.5 (copper) cable:

The data rate on twisted-pair segment depends on the link speed finally established with the link partner.

Application Notes

1. The media converter supports data conversion of the following packet types:
   - Untagged packets
   - 802.1Q tagged packets
   - Jumbo packets up to 9.6K size
2. The packet data will not be modified after conversion.
3. The packet conversion is performed at full wire speed.

4.2 Link Fault Pass Through Function

When the Link Fault Pass Through (LFPT) function is enabled and the media converter detects a link fault on one port segment, it will force the other port segment link down. It looks like that a link fault is passed from one port to the other.

The following example illustrates a link fault occurs on the fiber cable (any one cable in a duplex fiber connection). The link fault is forwarded to both copper link partners finally by LFPT operation of two media converters.

Cat.5
Copper port
Ethernet
device
Fiber cable
Cat.5
pass   pass
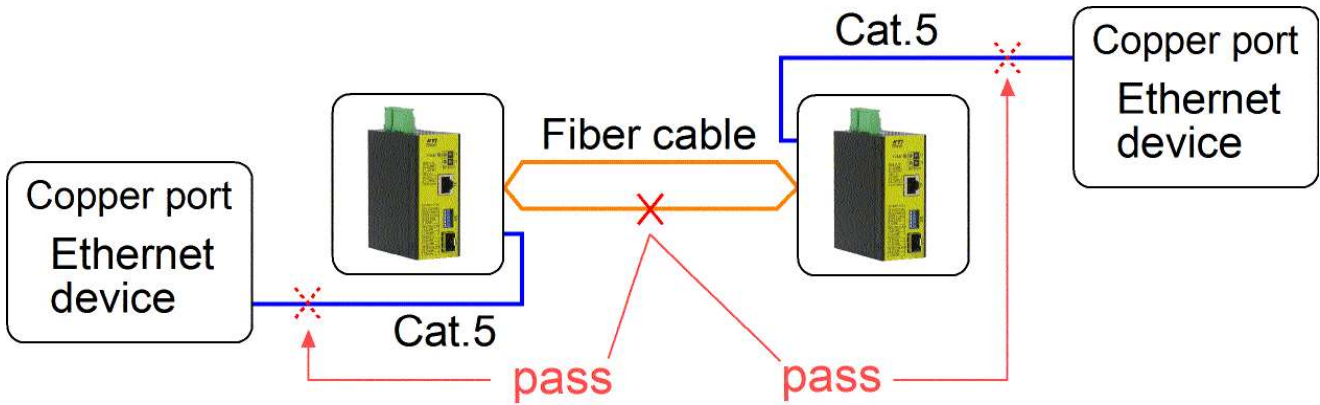
Both Ethernet devices will also detect a link fault on each Cat.5 connection, although the real fault occurs on the fiber connection exactly.

The following example illustrates a real link fault occurs on one Cat.5 and the link fault is passed to the other Cat.5 over two converters and the fiber cable by LFPT operation. Finally, the other link partner also detects a link fault.

Cat.5
Copper port
Ethernet
device
Fiber cable
Copper port
Ethernet
device
Cat.5
pass   pass
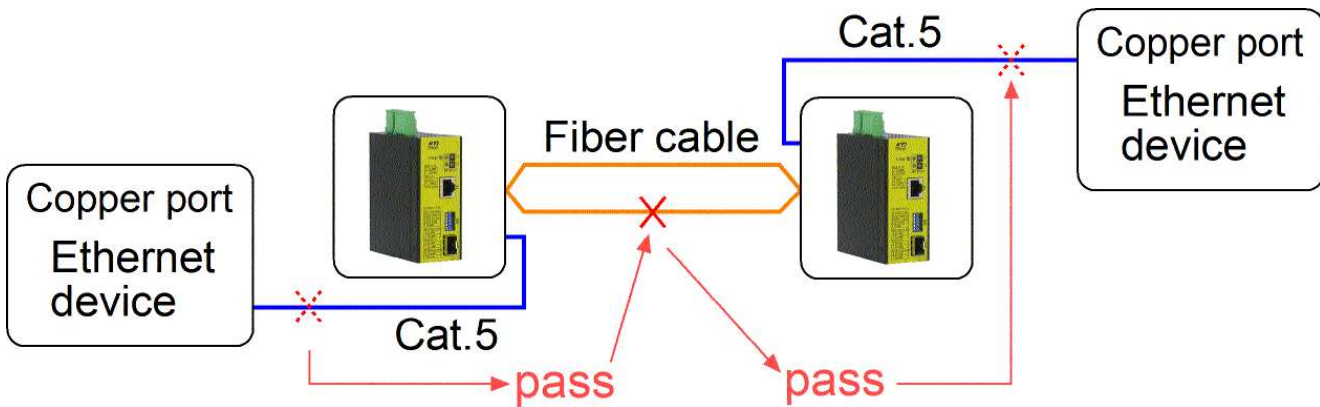
Advantage

The function allows two remote link partners of the media converters detect the link fault finally no matter where the exact fault occurs. It allows the upper application takes necessary action in case a real link fault occurs in any cable segment.

Methods to enable the function

The LFPT function can be enabled by setting DIP SW4 at "OFF" position.